

GUI Script

Fast & Easy way for graphic applications on SUN7

Enable Your Design

ThaiEasyElec.com 

On-line Electronics Shop for Embedded System



Introduction

- What Is GUI Script?
- Compared To Other Platforms
- How Does It Help?

What Is GUI Script?

“New concept for GUI development on SUN7”

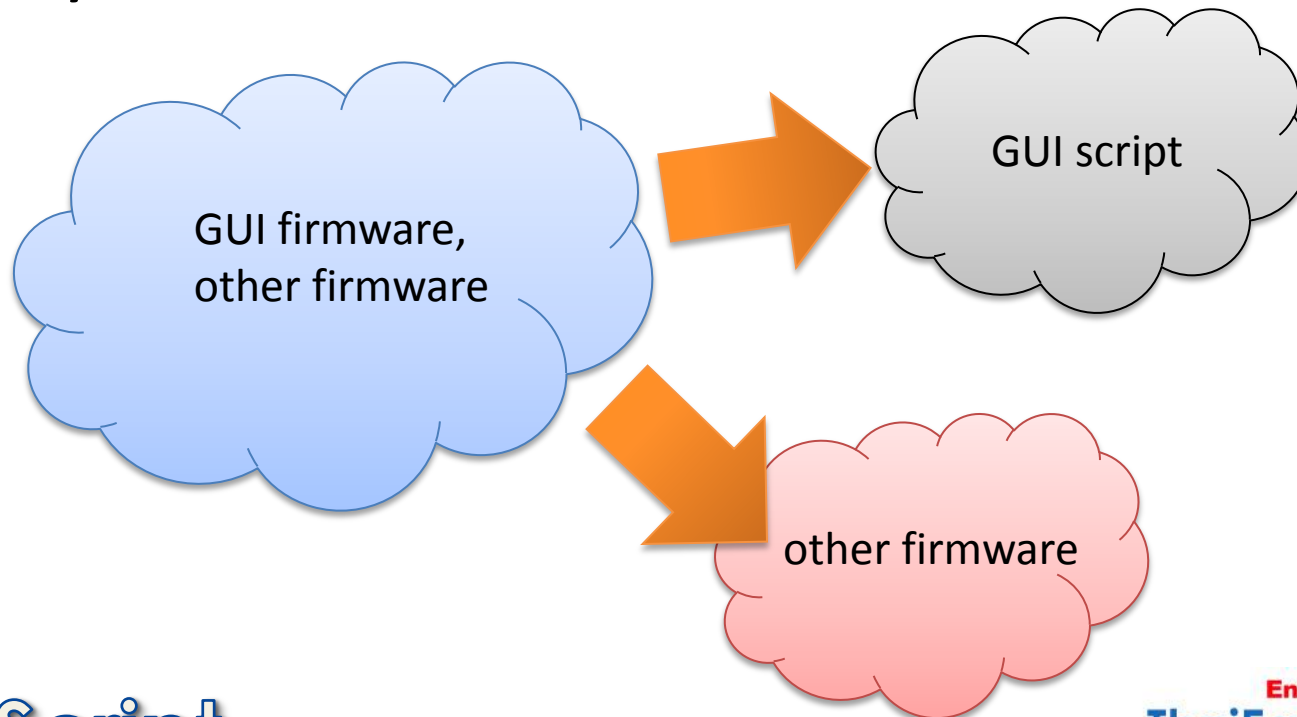
- Create GUI from script file
- Full of selectable effects, reduce code
- Works cooperatively with SUN7 example code
- **SUN7 Studio will be available in Q3 2011**

Compared To Other Platforms

- Most platform doesn't support big size LCD
- GUI Script let you stay on low cost hardware
- Non-OS platform, best for MCS-51, AVR, PIC, ARM programmers
- Not just display but reduce lot of coding

How Does It Help?

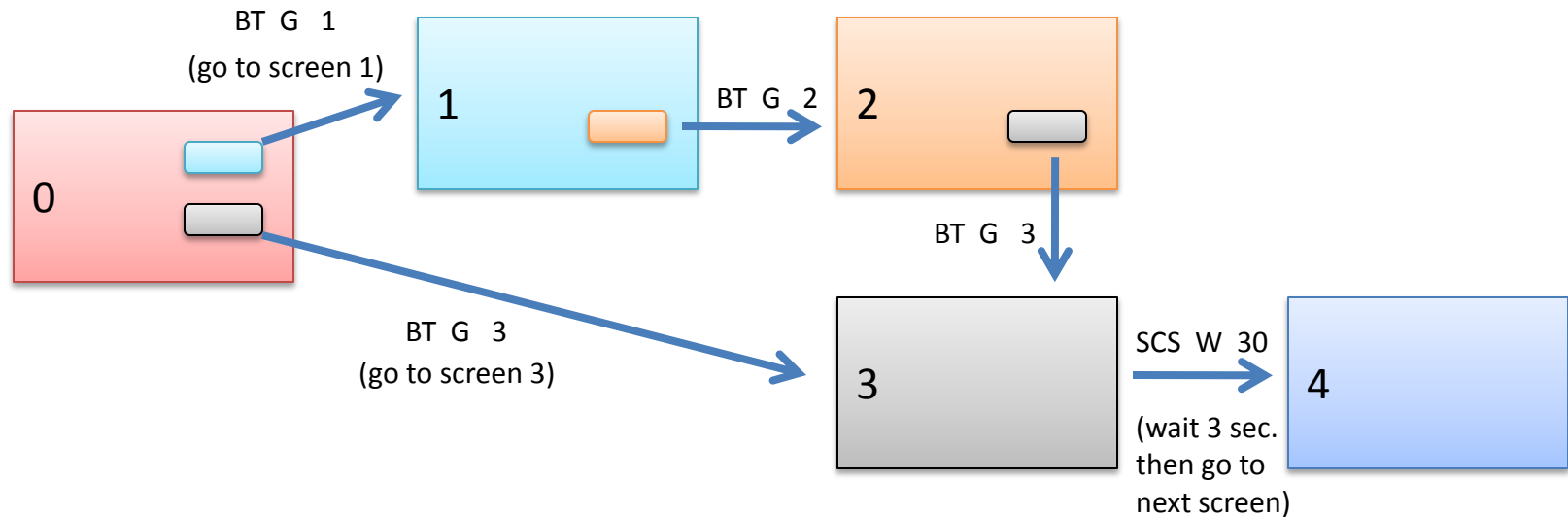
1. Writing script doesn't need programming experience, GUI work may be done with anyone



How Does It Help?

2. Faster demo, on real hardware!

With backgrounds and button images and some script demo may be done without programming needed



How Does It Help?

3. Provided effects reduce programming time

Example: Button changes & moves when it's pressed

Script file

```
GUI BT N 1  
GUI BT P 2  
GUI BT M 5 5
```

N = Normal,
P = Pressed,
M = Move



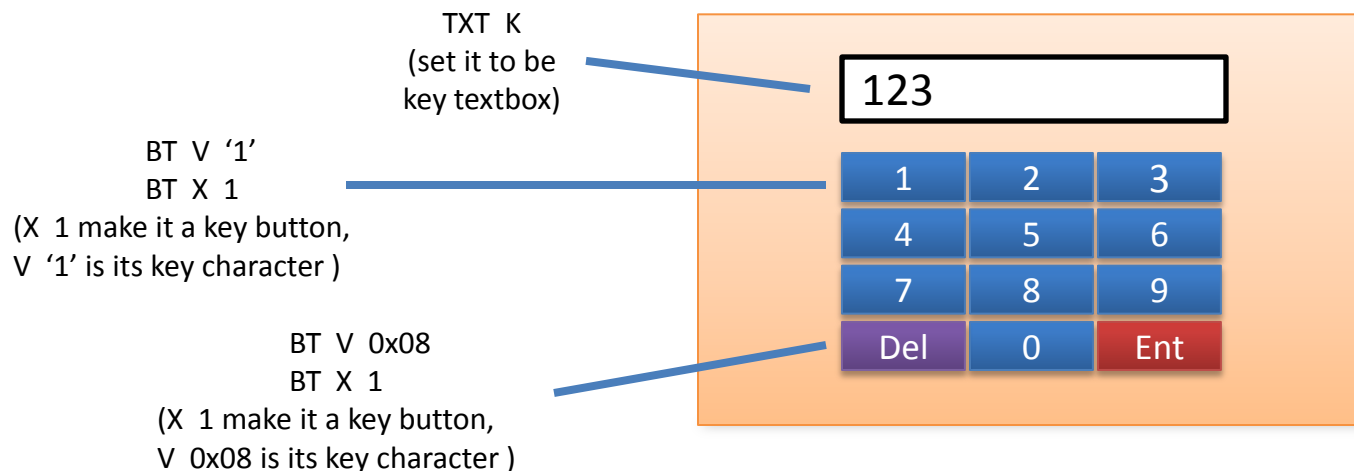
Press →



How Does It Help?

4. Advance GUI features provided

Example: Textbox and key buttons, when a key button pressed, its character added to textbox



How Does It Help?

5. MP3 file playback supported with additional MP3 decoder module, add sound to screens with a line of script

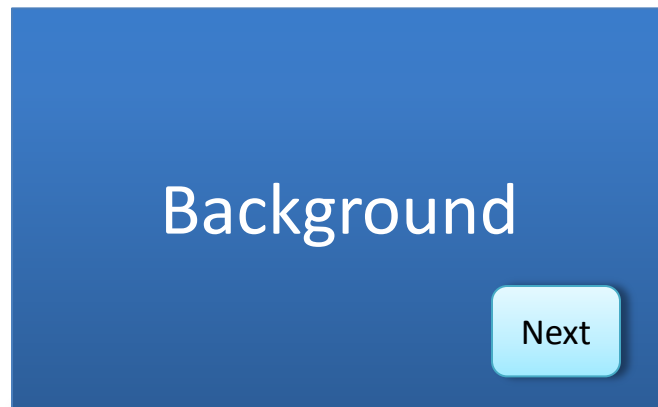


Can be connected
directly to the SUN7

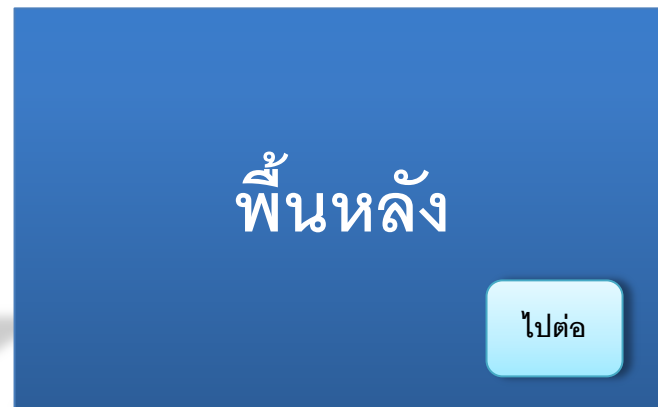
VS1011 MP3 Decoder Module

How Does It Help?

6. Up to 8 languages can be set to buttons, place them on the same position, the correct one will be activated (applicable to background, image, button, label and sound)



Language = 1



Language = 2

Language value maybe 1,2,4,8,16,32,64,128 to support one language from 1-8 respectively, setting to 255 make it supports all language





How it Works?

- How GUI Script Works?
- Components Supported

How GUI Script Works?

1. The **GUIInit** function reserves SDRAM memory for GUI component structures with the quantities defined in **app_scr_func.h**

Source code (app_scr_func.h)

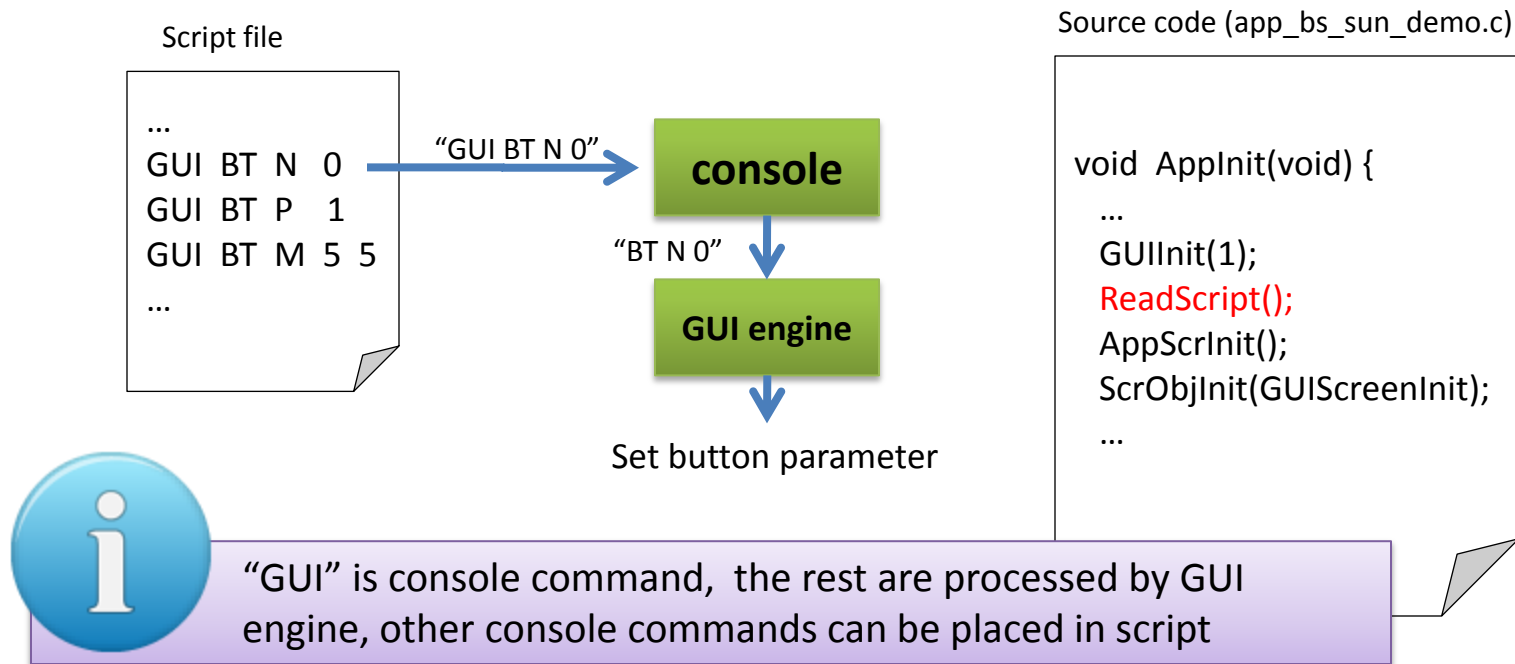
```
#define MAX_SCR          20
#define MAX_BACKGROUND  50
#define MAX_IMAGE       100
...
```

Source code (app_bs_sun_demo.c)

```
void AppInit(void) {
    ...
    GUIInit(1);
    ReadScript();
    AppScrInit();
    ScrObjInit(GUIScreenInit);
    ...
}
```

How GUI Script Works?

2. The **ReadScript** function read script line-by-line and put them to console



“Console”

in this document means the user-interface that use serial port for communication. It works as same as Linux serial console.

The default baud rate for console on SUN7 is 57600 and the default serial port is port 0 (not the port on your PC). It can be change by user to use other serial port or baud rate.

Normally, the target devices accept characters the user types from PC and echo back to the same serial port. The echo then appear on PC.

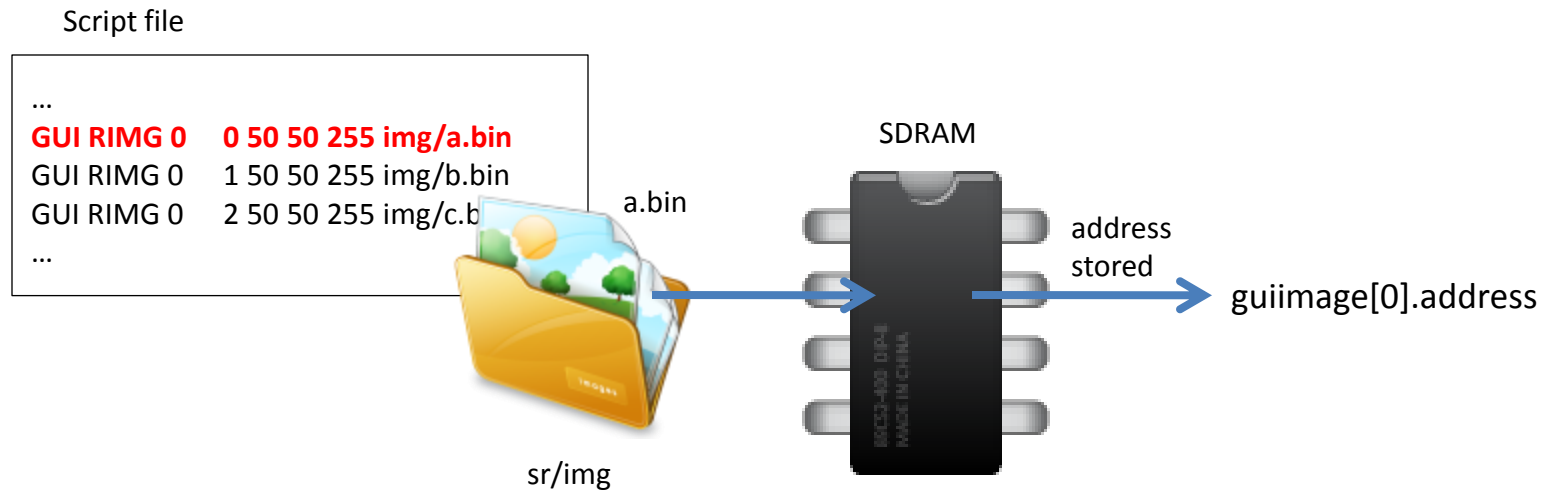
There are many commands implemented on SUN7 by default (see SUN7's user manual). Anyway, the user can create their commands on purpose.

To display commands available on SUN7, type “help<enter>”.



How GUI Script Works?

When a register command found, GUI engine read (and decode if required) the file then store it to SDRAM space and save the address to image parameter



How GUI Script Works?

3. The **AppScrInit** function (from [app_scr_func.c](#)) allows the user to bind events to user functions

Source code (app_scr_func.c)

```
void AppScrInit(void) {  
    guisc[0].init = scr0_init;  
    guisc[1].init = scr1_init;  
    guisc[2].init = scr2_init;  
    guibt[0].release = bt0_release;  
    ...  
}
```

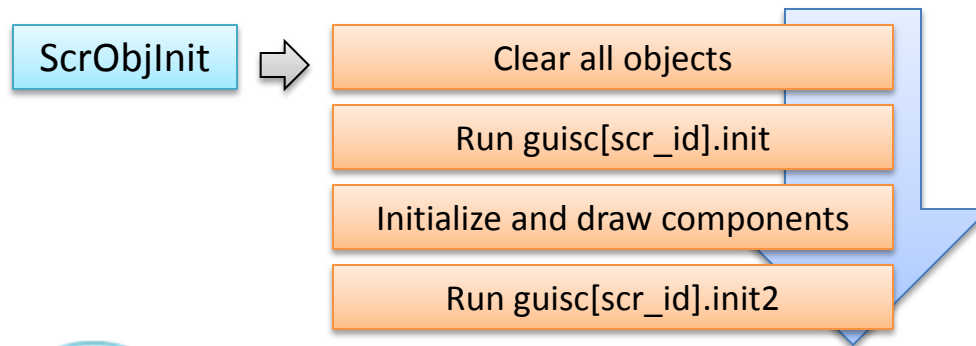
Source code (app_bs_sun_demo.c)

```
void AppInit(void) {  
    ...  
    GUIInit(1);  
    ReadScript();  
    AppScrInit();  
    ScrObjInit(GUIScreenInit);  
    ...  
}
```



How GUI Script Works?

4. The **ScrObjInit** starts the graphic application, it initializes background, components as set from “guisc[scr_id]”



Source code (app_bs_sun_demo.c)

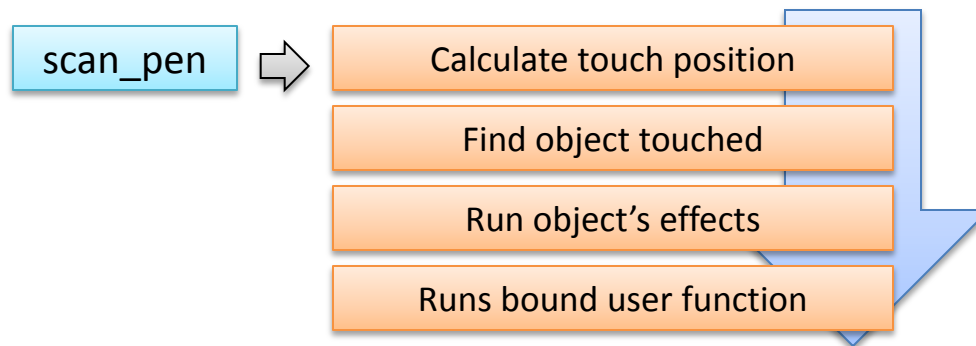
```
void AppInit(void) {  
    ...  
    GUIInit(1);  
    ReadScript();  
    AppScrInit();  
    ScrObjInit(GUIScreenInit);  
    ...  
}
```



“scr_id” is a global variable states the current screen ID,
“guisc” is the structure that keeps parameters for screens

How GUI Script Works?

5. The **scan_pen** function ([app_bs_sun_demp.c](#)) scanning every 10 ms for a touch, leads to native object's events and user functions



Source code (app_bs_sun_demo.c)

```
void AppTask10ms(void) {  
    scan_pen();  
    ...  
}
```

Components Supported

- Button
- Image box
- Textbox
- Table
- Label
- Box (for simple line or rectangular)
- **Percent bar (progress bar, volume bar)**





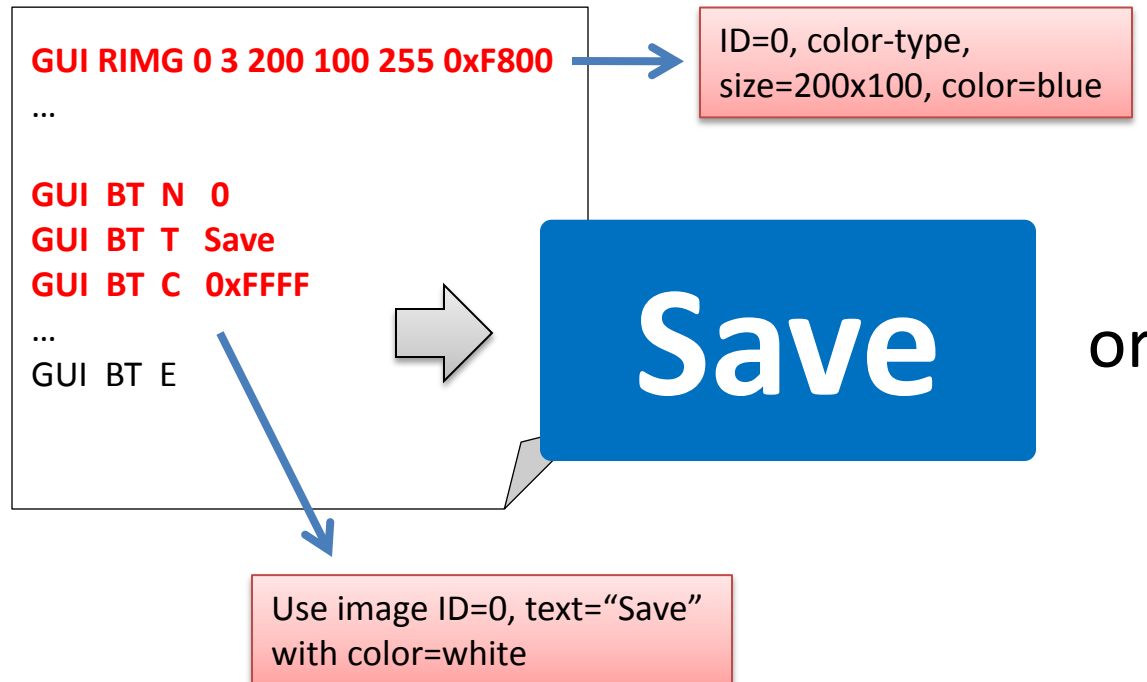
Example Features

Button, Textbox, Label,
Table, Font, Image Font,
Percent Bar, Popup

Example Features : Button

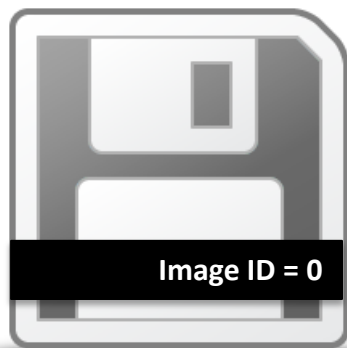
Selectable plain color button with text or image button

Script file



Example Features : Button

Assignable images for normal, disabled, pressed state



Disable



Normal



Pressed

Script file

```
GUI BT N 0  
GUI BT D 1  
GUI BT P 2  
...  
GUI BT E
```

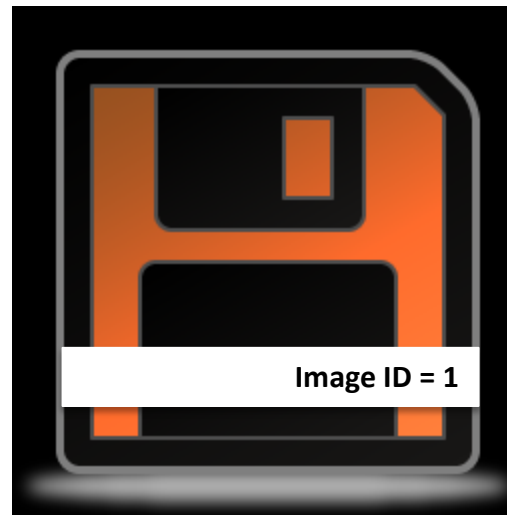
N = Normal,
D = Disable,
P = Pressed

Example Features : Button

Inverse when pressed



Normal



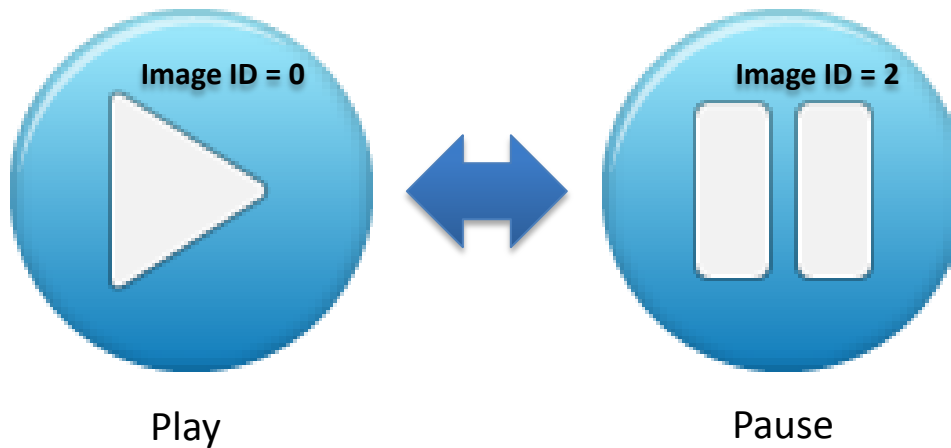
Pressed

Script file

```
GUI BT N 1  
GUI BT i  
...  
GUI BT E
```

Example Features : Button

Shift interlock mode, button switched to the next one when pressed (up to 8 buttons in the sequence)



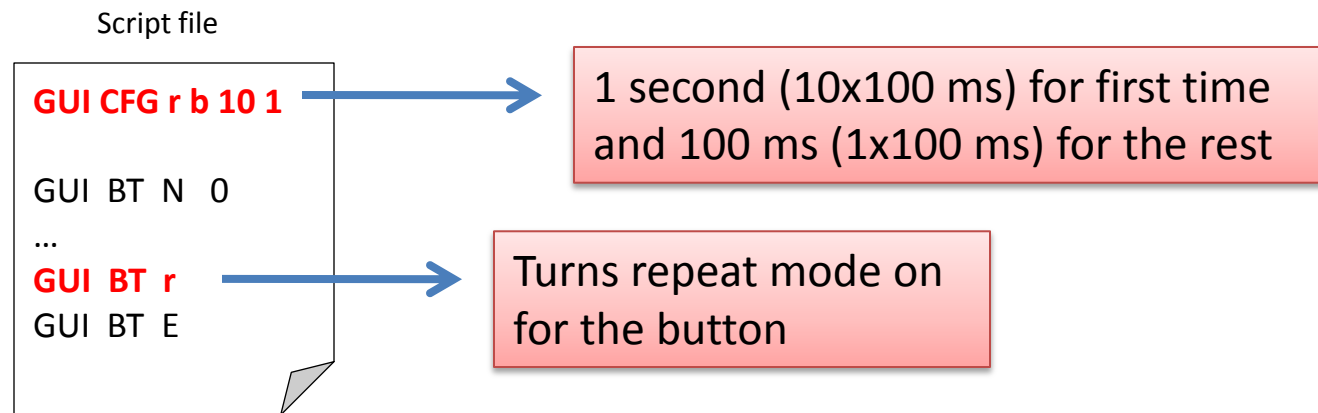
Script file

```
GUI BT N 0
GUI BT P 1
...
GUI BT I 0
GUI BT E

GUI BT N 2
GUI BT P 3
...
GUI BT I 1
GUI BT E
```


Example Features : Button

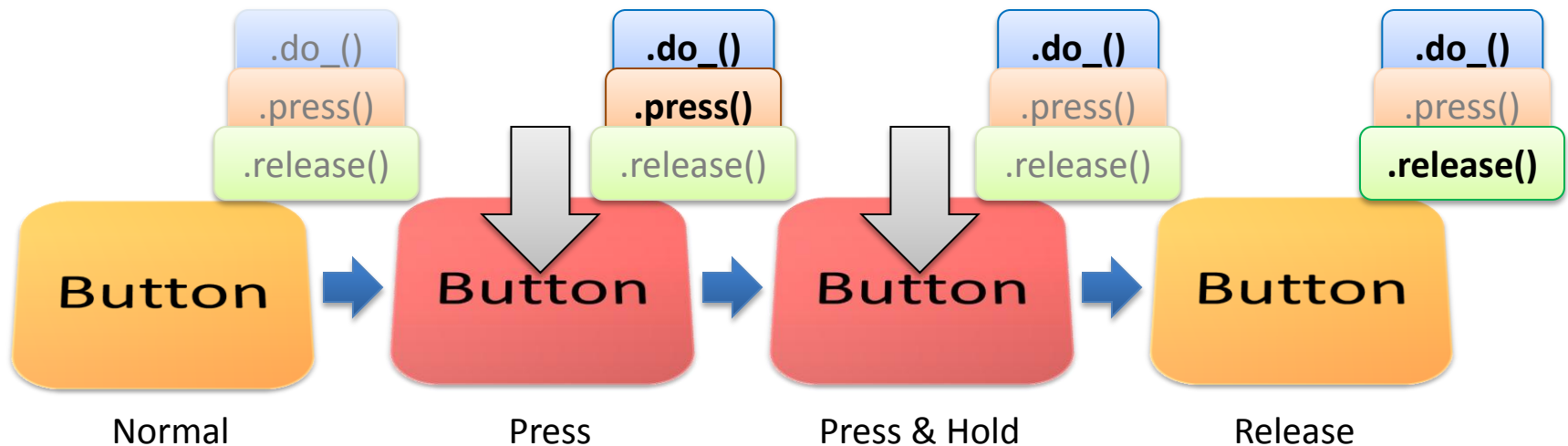
Repeated event occurs while being pressed
(both .press and .release run repeatedly)



Example Features : Button

Events for button

- .do_ (every case the button associated)
- .press
- .release



Example Features : Textbox

Password mode supported

Password

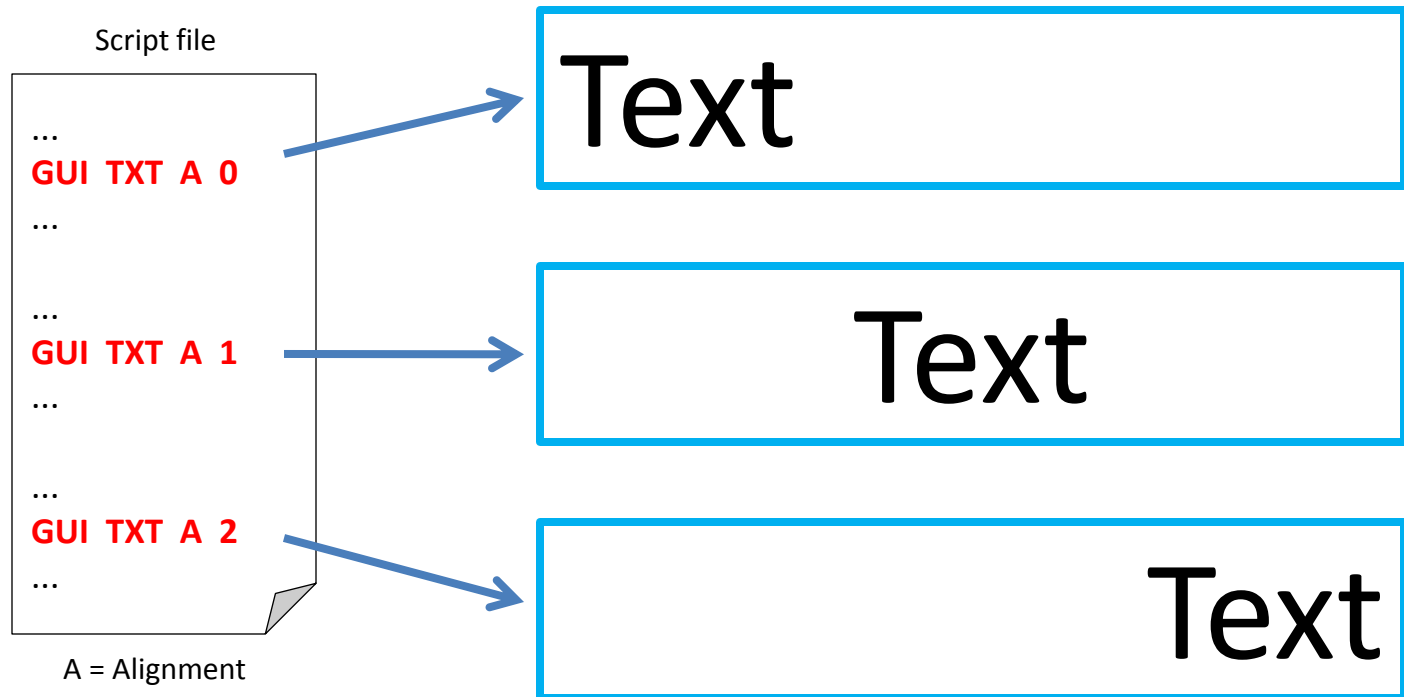
Script file

```
GUI TXT O 400 300
GUI TXT S 300 100
GUI TXT K
GUI TXT p '*'
GUI TXT E
...
```

Password mode set using
character '*'

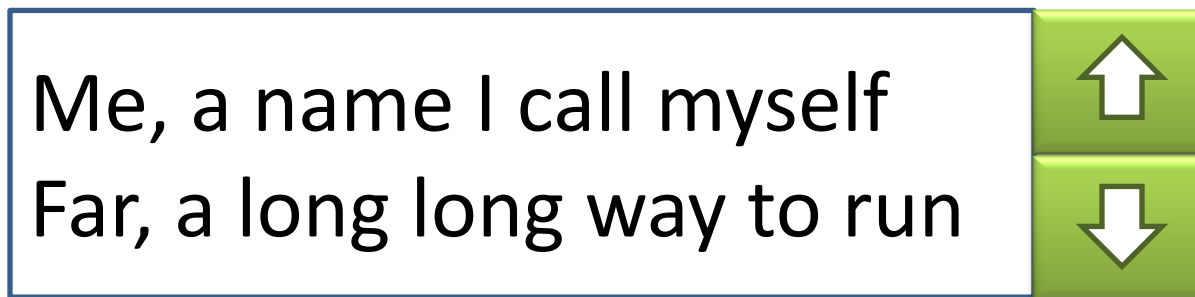
Example Features : Textbox

Left, center and right alignment supported



Example Features : Textbox

Multi-line supported (**textbox that contains more lines than it can display**) with move up and down functions provided (can't be used with image font)



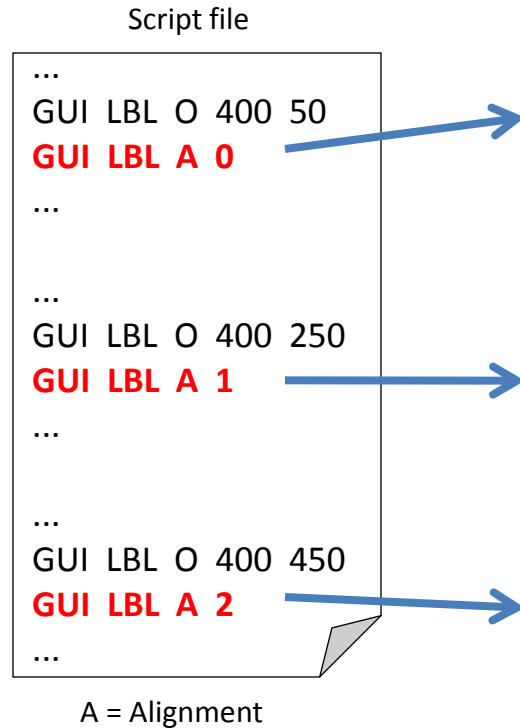
Script file

```
...  
GUI TXT K  
GUI TXT L 100  
GUI TXT m  
GUI TXT E
```

M = multi-line

Example Features : Label

Left, center and right alignment supported



Text

Text

Text

Example Features : Table

- Define dimension, color and caption text with script
- Content writable by software
- Events provided with calculated column and row

Script file

```
...
GUI TAB O 200 170
GUI TAB c 0 250 0x07E0 0xffff Product
GUI TAB c 1 100 0x07E0 0xffff Score
GUI TAB R 40 4
GUI TAB A 1
GUI TAB E
...
```

Product	Score
SUN7	

Example function usage: `GUIWriteTable(0,1,0,"SUN7");`

Example Features : Font

Supports English font and extension font, default is Thai (for other language please contact us for more detail)

Script file

```
GUI RFONT  0 ...  
GUI RXFONT 0 ...  
  
GUI TXT O 100 200  
GUI TXT S 400 100  
GUI TXT F 0 0  
...
```

Text ข้อความ

First 0 is English font ID,
second 0 is extension font ID

Example Features : Image Font

Display image font on textbox or label

(images must have same height, can't be used with Thai font)



Script file

```
GUI RIFONT 0 '0' 10 25 2
```

```
...
```

```
GUI RIMG 25 255 num0.bmp
```

```
GUI RIMG 26 255 num1.bmp
```

```
GUI RIMG 27 255 num2.bmp
```

```
GUI RIMG 28 255 num3.bmp
```

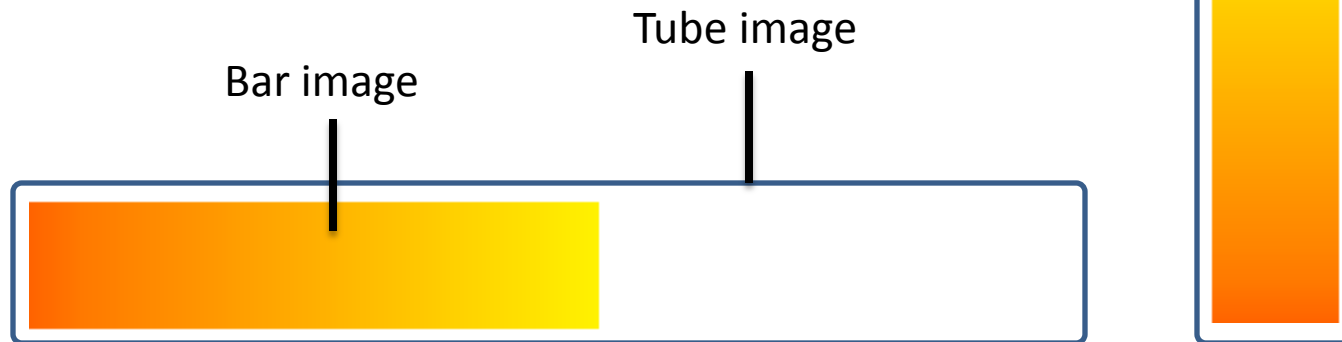
```
GUI RIMG 29 255 num4.bmp
```

```
...
```

ID=0, first character is '0',
10 images used with first ID=25,
gap between characters=2 pixels

Example Features : Bar

- Horizontal or vertical bars
- Move and stop events



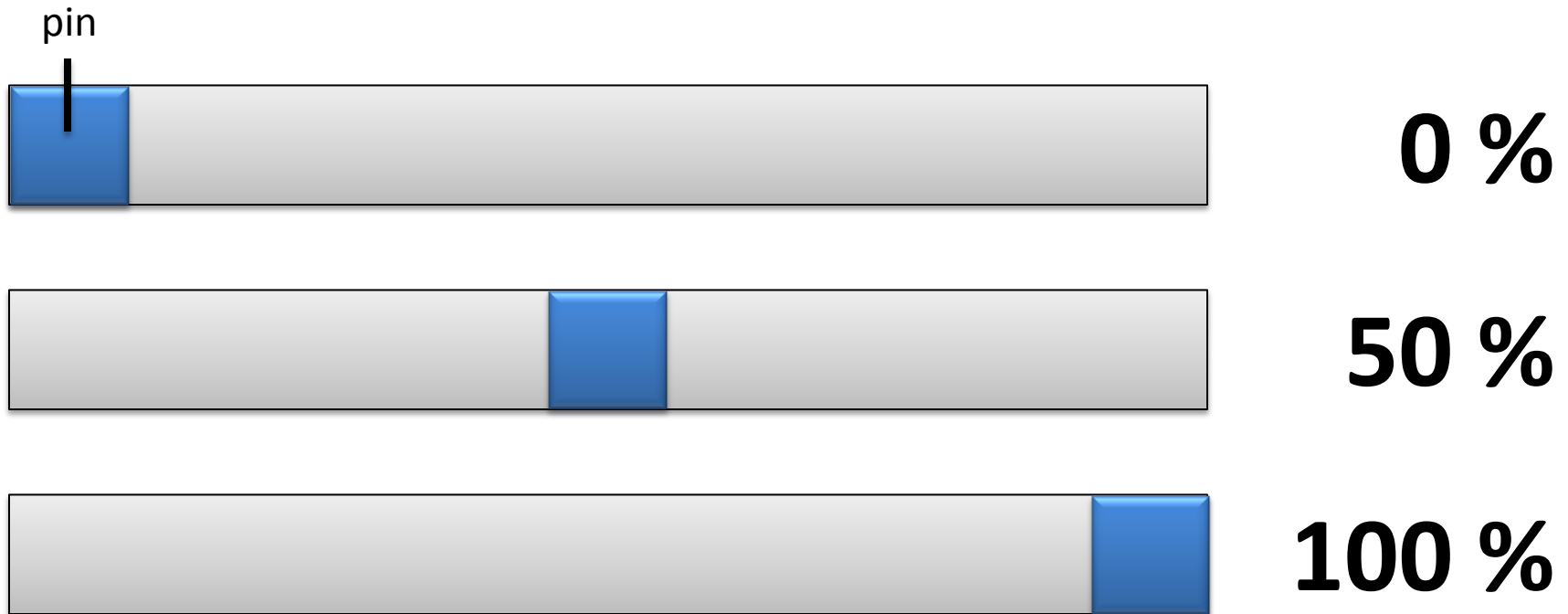
Example Features : Bar

4 touch response styles

- No response (change value by software only)
- Move to the touch
- Follow the touch movement
- Slide with touch movement

Example Features : Bar

'Pin' supported



Example Features : Bar

- 2 movement types



50 %



100 %



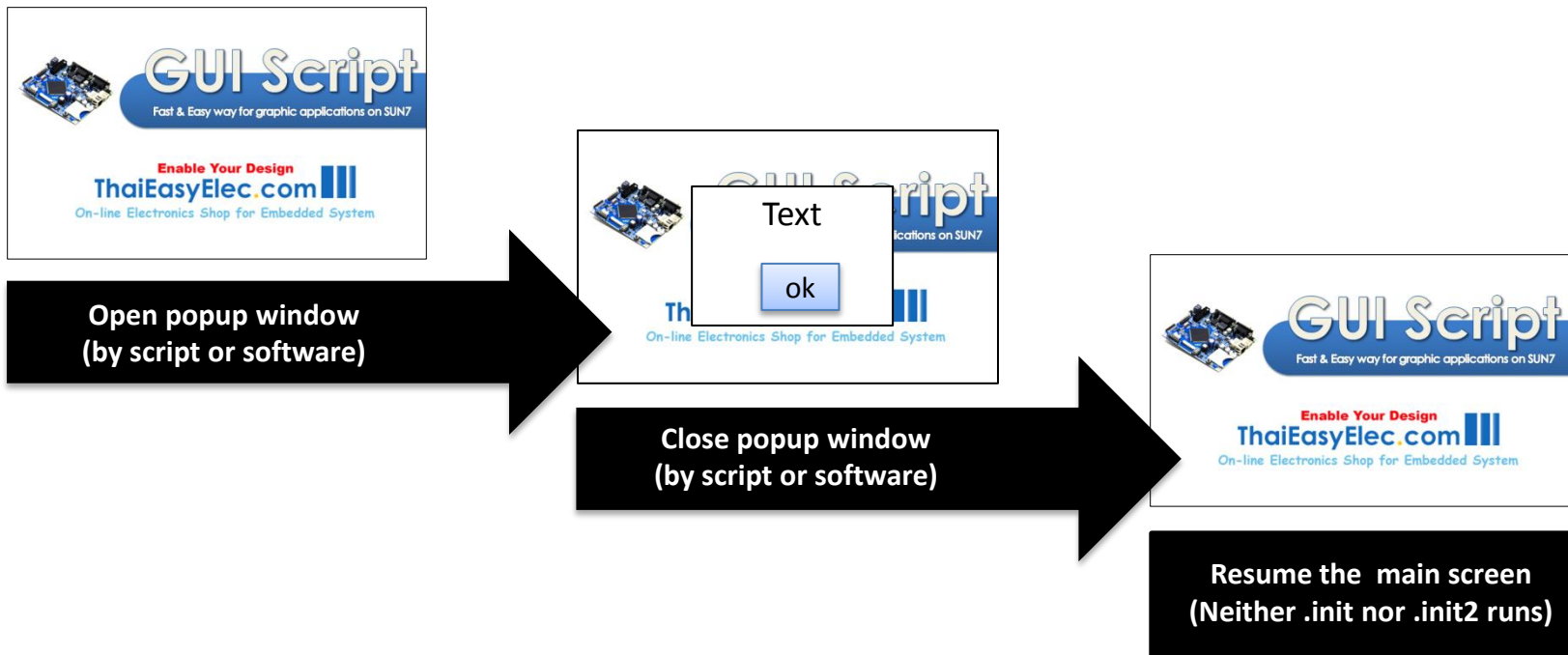
50 %



100 %

Example Features : Popup

Show popup window on any screen



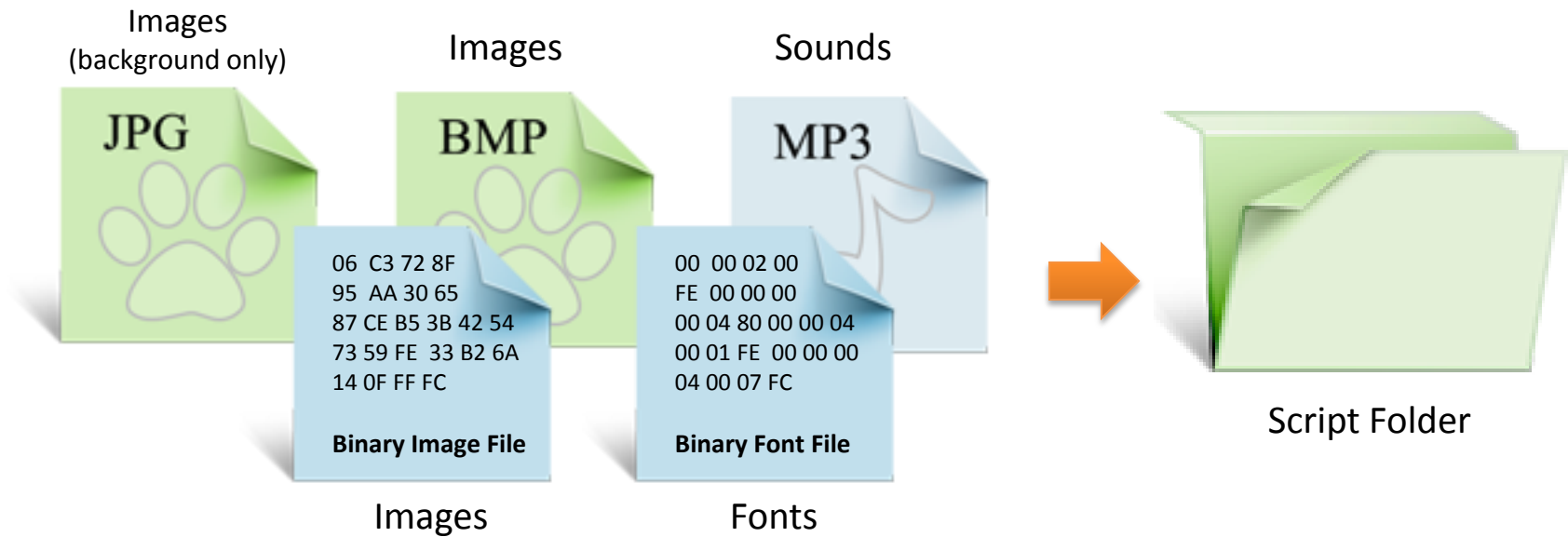


Implementation

- Resource Gathering
- Making Script
- Compile & Run

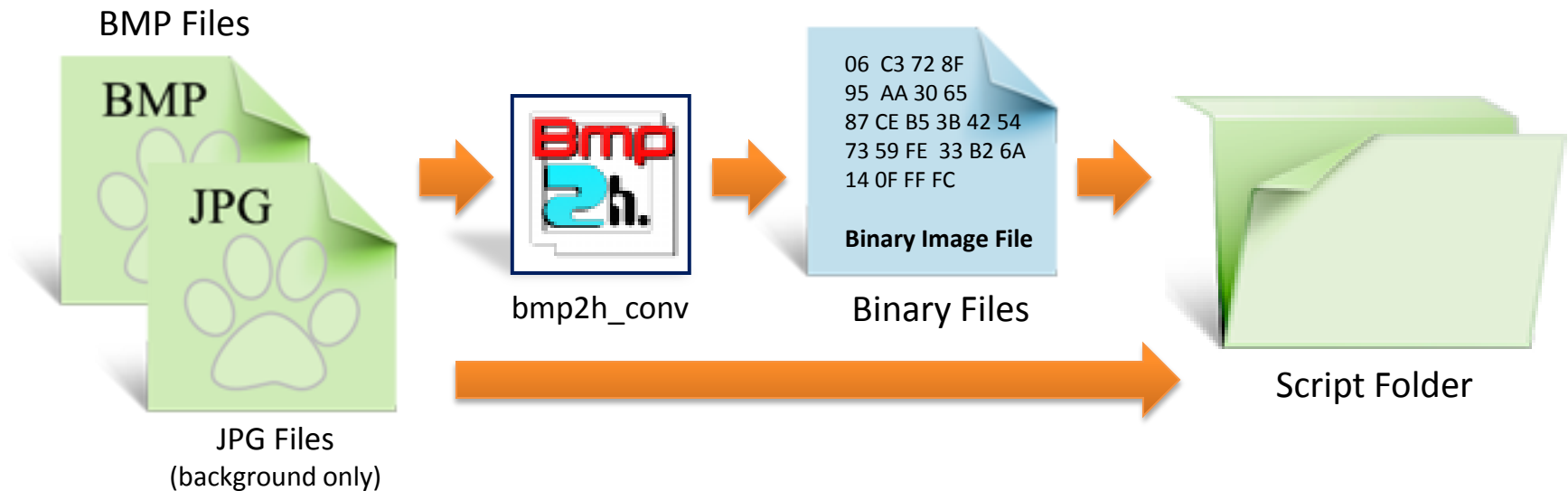
Resource Gathering

Prepare resource files and put them in script folder
(recommend to create subfolder)



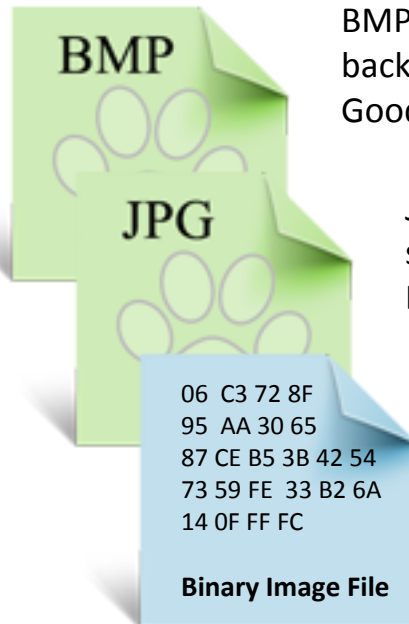
Resource Gathering

Image files can be BMP, JPEG or converted binary format



Resource Gathering

Compare between BMP, JPEG and binary image files



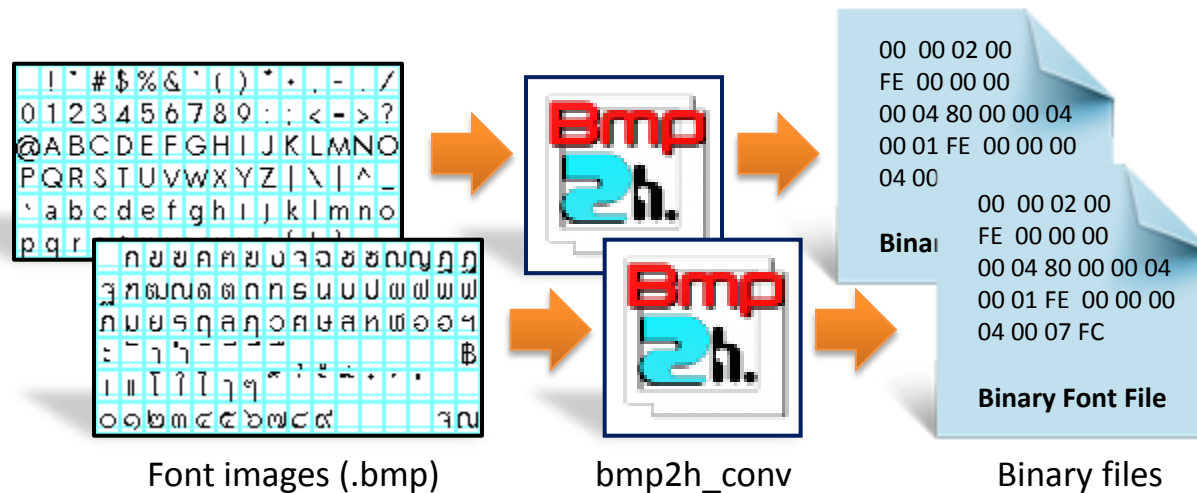
BMP files are large (3 bytes per pixel), can be used for both background and general images
Good for development state or simple application

JPEG files are smallest but takes extra time to decode (once the system boot) and **can be used for background only**
Best for on-line system that upgrade is required

Binary files are small (2 bytes per pixel for 16-bpp) and take shortest time to boot, best for final state
Using binary file needs image size to be specified in the script

Resource Gathering

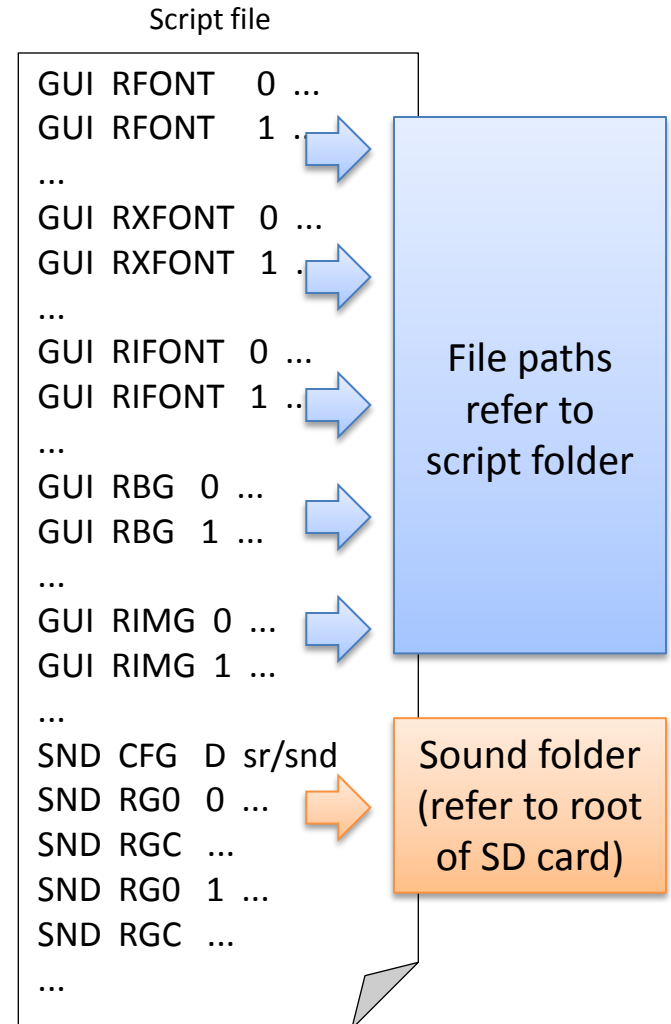
Fonts can be made by writing array of characters in BMP files then convert it using **bmp2h_conv** to binary file (downloadable from our website)



Making Script

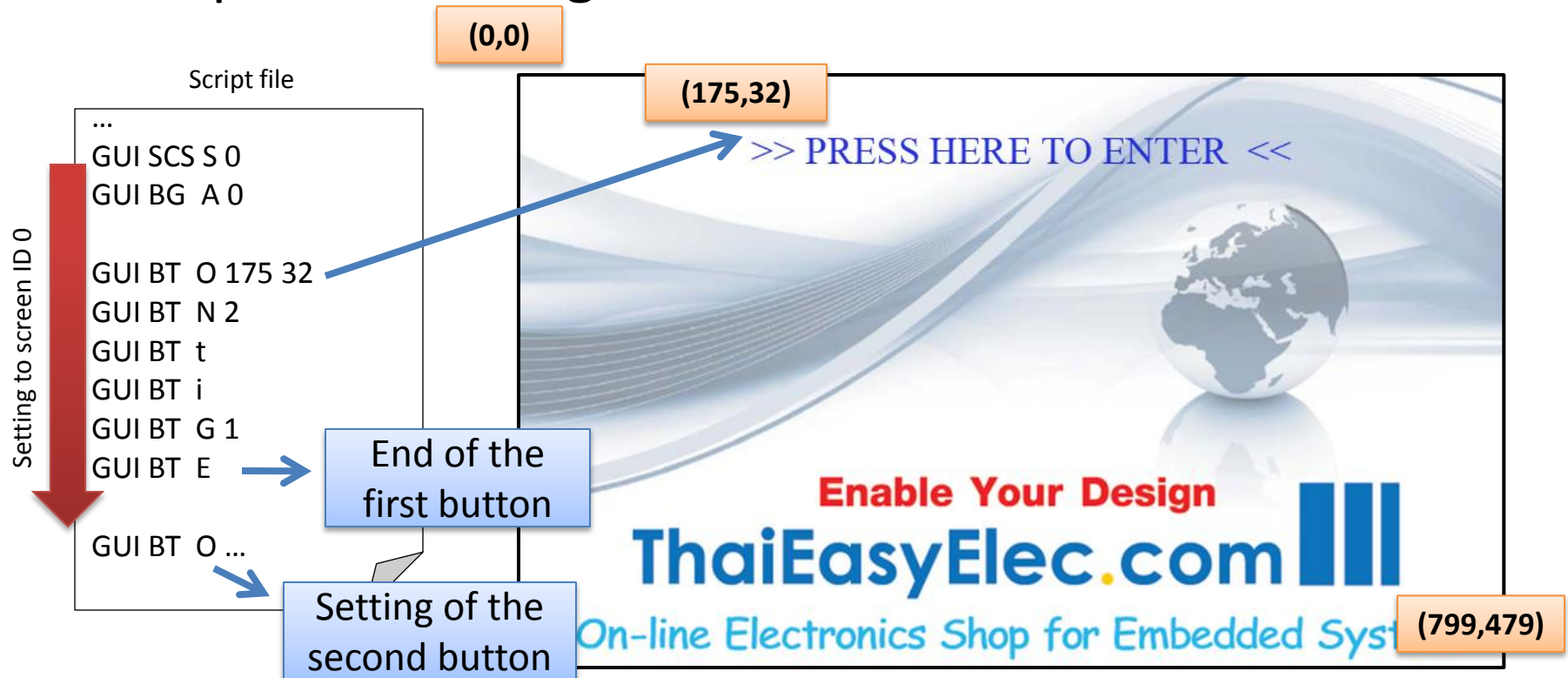
Register resource files with register command

- **RFONT**: Normal font
- **RXFONT**: Extension font
- **RIFONT**: Image font
- **RBG**: Background
- **RIMG**: Image
- **RG0, RGC**: Sound



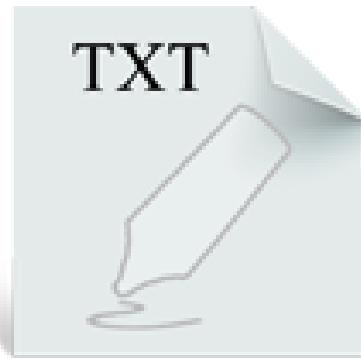
Making Script

Write script screen by screen, 'E' ends current component setting



Making Script

Put the script file in script folder, name it
“main.txt”



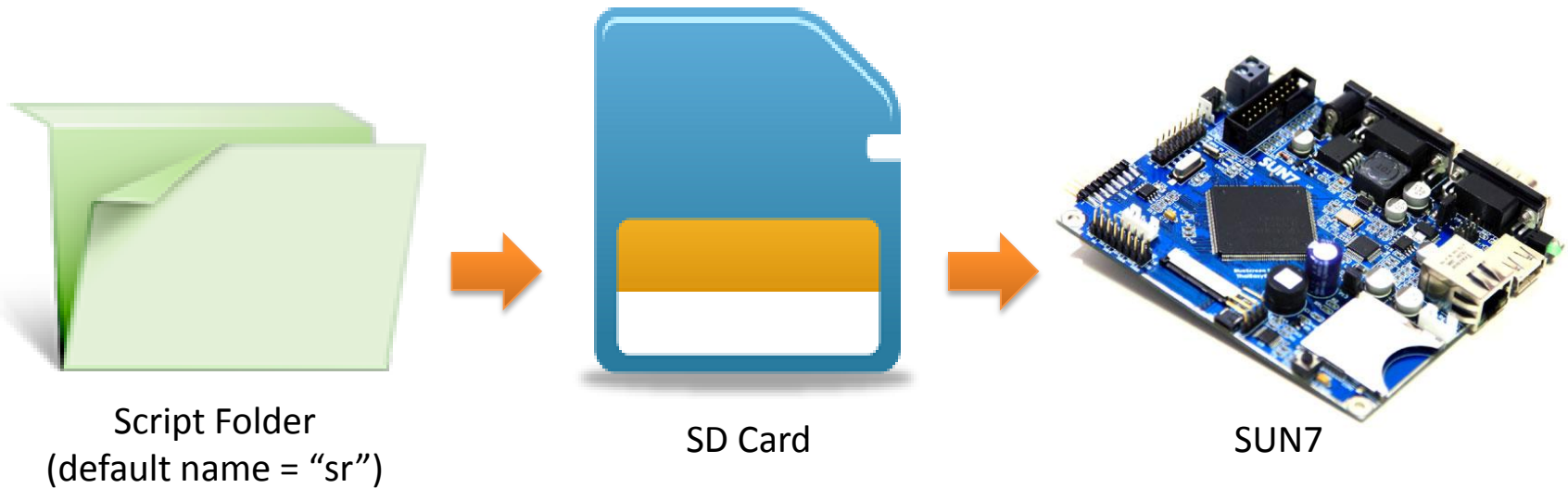
Script File (main.txt)



Script Folder

Making Script

Name the script folder with the same as in the code (default name is “sr”), put it onto SD card, insert it to SUN7



Compile & Run

From example project, **cleanup source code in AppScrInit**, compile, download firmware to the board and run it

Source code (app_scr_func.c)

```
...  
  GUIGotoScreen(5);  
}  
  
void AppScrInit(void) {  
  unsigned char i;  
  memset (all_vote,0,5);  
  ...  
}
```



Source code (app_scr_func.c)

```
void AppScrInit(void) {  
  
}
```

The incompatibility between firmware and script can make the board run improperly



Compile & Run

Monitor console port (serial port 0 by default) using terminal software while loading GUI script to see if there are any error

- If there are any error shown on LCD, try capturing the serial data and search for words "ERROR"
- When maximum number of a component reached or exceeded, the red warning shown on LCD after "GUI END" script found



```

#####
GUI END

29 image(s) loaded

18 button(s) created

3 image(s) on screen set

2 textbox(es) created

1 table(s) created

11 label(s) created

0 box(es) created

text pool size(byte): 330

Error GUI command(s) : 0

BAUDRATE1 9600
312 line(s) read from script file
-
  
```

Compile & Run

Start coding your application by creating user functions and bind them to events

Source code (app_scr_func.c)

```
void AppScrInit(void) {  
    guisc[0].init = user_scr_init0;  
    guisc[1].init = user_scr_init1;  
  
    guibt[GUIGetBtID(0,2)].release = user_bt_release;  
    //0 = first screen  
    //2 = 3rd button  
}
```



user_xxx functions are user functions, can have any names



More Info?

Checkout the latest **GUI Script User Manual**

[http://www.thaieasyelec.net/archives/Manual/GUI Script User Manual v1 03.pdf](http://www.thaieasyelec.net/archives/Manual/GUI%20Script%20User%20Manual%20v1%2003.pdf)

Includes...

- All features
- All script commands
- All GUI function description
- Programming guidelines

More Info?

Checkout the board's user manual

[http://www.thaieasyelec.net/archives/Manual/BlueScreen SUN7 User%20Manual v1 02.pdf](http://www.thaieasyelec.net/archives/Manual/BlueScreen_SUN7_User%20Manual_v1_02.pdf)

Includes...

- Peripherals on SUN7
- Example code description
- Console command description
- How to download firmware

Try it now!

Download example project for Eclipse & Yagarto (free software) :

http://www.thaieasyelec.net/archives/Manual/4_3inch%20Yagarto%20Example%20Project.zip

<http://www.thaieasyelec.net/archives/Manual/7inch%20Yagarto%20Example%20Project.zip>

Example project description :

http://www.thaieasyelec.net/archives/Manual/ANGS1_00_01_Example_Project.pdf

Startup guide for Eclipse and Yagarto :

http://www.thaieasyelec.net/archives/Manual/ANSUN71_00_01_Startup_Guide_for_Eclipse_&_Yagarto.pdf



Thank You

Please feel free to contact us at
support@thaieasyelec.com